

n-p Junction:

<http://hyperphysics.phy-astr.gsu.edu/hbase/solids/pnjun.html>

Energy Sources:

Next class greenhouse effect

April 13th lab A119 sign in to computers for simulations and database work

Table:

Energy source	Advantages	Disadvantages	Physics
Fusion	Lots of energy - highest density No waste - greenhouse gasses or radioactive waste	Need high temperature and pressure for nucleii to fuse. Containing and using the energy is problematic.	Torus of magnets to contain rotating plasma.
Solar	Infinite powerful source, no pollution	Takes up area, and presently costly, not accessible during the night	Photoelectric effect Photovoltaic cells or direct heater(black pipes with water + reflector) $\text{Energy} = P/A \times A \times t$
Wind power	Renewable, Prices decreasing	Inconsistent, Not space efficient Loud, damage to birds and bats	Electromagnetic induction. $\text{Energy} = 1/2 \rho A v^3$ ρ Is the density of the medium, A is the cross-sectional area or the blades. v is fluid speed.
Biofuels and waste	Carbon neutral, grow it and burn	Less efficient, more costly,	Exothermic reaction, heats water to steam

	it. Bio-degradable, sustainable,	takes a lot of water and soil, clogs engines,	and turns turbine for electricity, or run an engine.
Gas	Easy to transport, easy to get,	Low energy density, greenhouse gasses, hazardous, needs to be refined.	See above
coal	Cheap, long burning, abundant,	Creates greenhouse gasses and particulate matter, mining bad for environment.	See above
geothermal	Renewable, no co2 emission, upkeep cheap,	Certain locations, can release gasses,	$Q=mc\Delta T$
fission	High energy density, low greenhouse gas emissions, mining uranium is relatively cheap. Breeder reactors produce plutonium for bombs?	Building reactors is expensive, radioactive waste, meltdowns, breeder reactors produce plutonium for bombs?	Uranium 235 decays when hit by slow neutron into daughter nuclei and more neutrons.
hydro			
batteries			
Tidal power			
Wave power			

Energy source	Advantages	Disadvantages	Physics
Solar	Low emissions, renewable, sun has lots of energy	Low efficiency, not viable in Raincouver,	2 types, photovoltaic cells (photo electric effect) - black pipes and mirrors - hot water
wind	Low emissions, renewable,	Ugly?, not always windy, maintenance, kill birds and bats, noisy	Electromagnetic induction from spinning coil near a magnet. $\text{maxEnergy} = \frac{1}{2} \rho A v^3$ ρ is the density of the medium, A is the cross-sectional area of the blades. v is fluid speed.
hydro	Low emissions, renewable, reservoir of water,	Loss of habitat, ecosystem problems, water use conflict, sedimentation,	Mgh - induction See wind for water flow
geothermal	Low emissions, sustainable,	Limited locations, can be expensive, limited power.	$Q=mc\Delta T$ could turn a turbine if hot enough to boil water
tidal	Low emissions, consistent,	Locational limitations, high upfront cost, disturbs habitat	See hydro or turbine
Fossil fuels, Gas, coal	Cheap, easily found, income, low energy density	Produces greenhouse gasses and particulates (smog) especially coal,	Turbine driven,
fission			
fusion			

wave			
biomass			
Fuel cells			
batteries			